CIG Medishield

MID-O-GAS APPARATUS SERVICING INSTRUCTIONS

EQUIPMENT COVERED

Mid-O-Gas Analgesic Apparatus, TM111, TM114, and TM36 (obsolete).

SPECIAL TOOLS AND TEST EQUIPMENT

Test Unit with adaptor for
(i) Vacuum measurement (ref. Fig. 2)
(ii) Oxygen analyser (ref. Fig. 2)
Inclined water tube manometer
Oxygen analyser 0-100% O_2
Wright Respirometer
Box spanner, ¼" BSW
Screw driver, ¼" diameter by 4" blade length.
Open ended spanners: 3/8" A.F.
16 mm
Allen key, 5/32"
Approved oxygen compatible lubricant.

PREVENTIVE MAINTENANCE PROGRAMME

(Recommended every 3 to 6 months unless otherwise specified).

Check	Nature of Service
1	Basic assembly inspection.
2	Leak test
3	Inspiratory effort test
4	Output composition test
5	Alarm whistle and air valve function test
6	Emergency oxygen valve performance
7	Primary regulator servicing (annually)
8	Exhale valve performance
9	Final Test

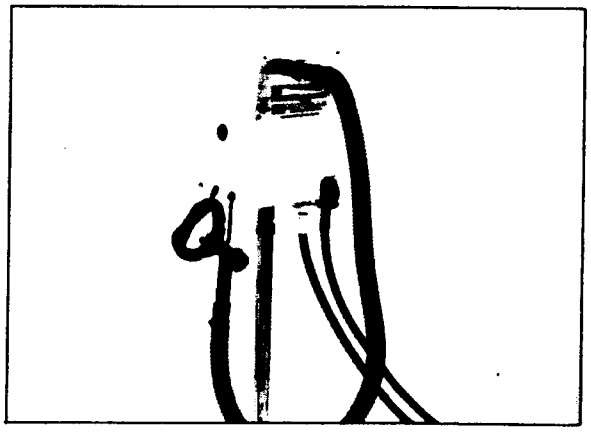
Procedures

A	Setting oxygen percentage.
B	Dismantling procedure
C	Reassembly procedure

SERVICING PRECAUTIONS

Oxygen reacts explosively with oil, grease, and flammable solvents. When handling and dismantling all components keep them free from oil, grease, non-approved solvents, and foreign materials.

Use only approved solvents and lubricants. CIG leak detector solution, Snoop solution, or pure soap completely dissolved in water, may be used for leak detection. All traces of deposit must be removed at the completion of testing.



Do not test equipment by inhaling through it. Always use test apparatus as detailed.

Use only lint-free cloth for internal and external cleaning.

DETAILED SERVICING PROCEDURE

Check 1. Basic Assembly Inspection

Inspect apparatus for cleanliness and signs of damage. Ensure all labelling is clear and intact.

Check master control valve for positive action, corrugated breathing tube and face mask for damag or signs of perishing.

Inspect gas supply hoses and connections for correct colour coding and handwheel identificatior thread damage and effective sealing. Examine support stem, base, and castors for damage.

Check wall attachment security, where applicable.

Check 2. Leak Test

2.1 Turn on master control valve.

2.2 Remove corrugated breathing tube from unit outlet connection. Partially occlude outlet and bubble test for leaks. A slow bubble leak is allowable.

If a significant, continuous leak occurs then a high pressure in the control regulator is suspect. Refer to the Oxygen Percentage Setting Procedure for the correction technique.

If an intermittent delivery occurs a leaky control regulator seat is suspect. Refer to the Dismantling Procedure for the maintenance technique.

Check 3. Inspiratory Effort Test

3.1 Connect the Test Unit with a water tube manometer attachment (Fig. 2) to the apparatus outlet. Squeeze the recoil bag gently and release to create a negative pressure as the bag attempts to reform.

3.2 Check that an indicated negative pressure of -1 to -2 cm H_2O initiates unrestricted flow.

A high resistance at the start of inspiration indicates that cleaning of the demand valve shut-off disc is required. Refer to the section on Dismantling Procedure.

Check 4. Output Composition Test

4.1 Attach the Test Unit with an Oxygen Analyser connection (Fig. 2) to the apparatus outlet.

4.2 Compress and release the recoil bag approximately 7 to 9 times over 30 seconds and note the output percentage O_2 reading on the analyser.

Performance readings are to be taken at the percentage control lever settings of 30%, 40%, and 60% oxygen. Allowable variation of the analysed gas mixture output to the scale reading is 0% to +5%.

If the oxygen content reading is outside this tolerance corrective adjustment is to be carried out as per the oxygen percentage setting procedure.

Check 5. Alarm Whistle and Air Valve Function Test

5.1 Turn off oxygen supply only.

5.2 Press the emergency oxygen valve to reduce pressure within the apparatus and ensure the warning device alarm whistle sounds clear and audible.

5.3 Position the percentage output setting lever at 30% O_2. Check the output of the unit under inspiratory effort produced by the recoil bag to ensure that in excess of 10% O_2 is measured on the analyser.

NOTE: Failure to maintain this minimum oxygen percentage in the outlet flow indicates a faulty air inlet valve.

5.4 Re-establish the oxygen supply and note that the warning device alarm whistle is cancelled upon rising pressure.

Check 6. Emergency Oxygen Valve Performance

6.1 Connect a Wright Respirometer to the apparatus outlet and attach the Test unit fitted for oxygen analysis.

6.2 Press the emergency oxygen valve and ensure a minimum flow of 30 L/min leaves the apparatus at a composition of 100% O_2.

Check 7. Primary Regulator Servicing (Annually)

The primary regulators, Mini-reg Model 518495, are to be serviced annually. This includes replacement of the diaphragm and seat/spindle combination components. 280 KPa

Procedures to be followed are detailed in the Mini Regulators Servicing Instructions Publication 521483.

Check 8. Exhale Valve Performance

8.1 Remove the corrugated breathing tube and face mask from the exhale valve assembly.

8.2 Attach the recoil bag to the handpiece mask connector and occlude the handpiece breathing tube connector. (Fig. 1).

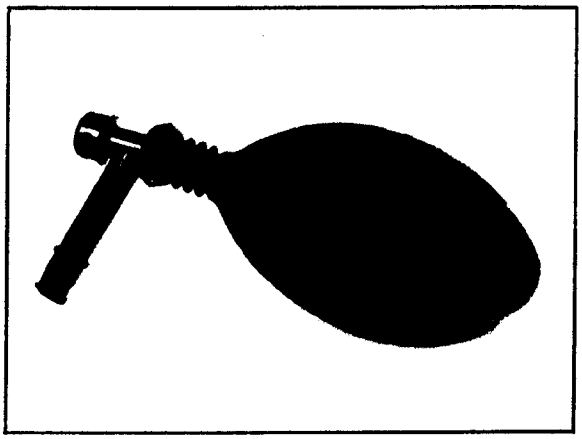


Figure 1.

8.3 Squeeze the bag and ensure the exhale valve vents freely. The effective seal of the valve will be demonstrated by the inability of the bag to fully restore its shape.

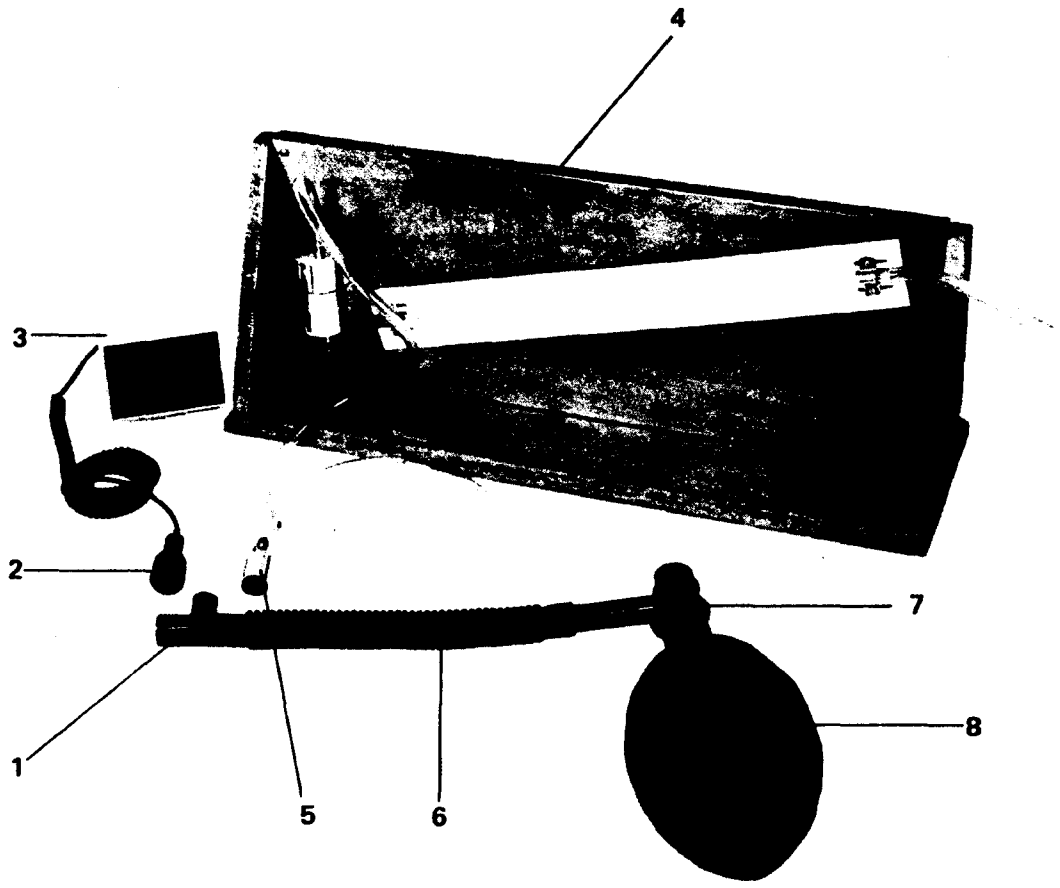
NOTE: If the expiratory valve malfunctions — dismantle as follows:

Push firmly on the raised lip of the cover cap until the cap is free. Gently remove the rubber diaphragm. Replace, if faulty, by pressing the new valve gently into position on the collar stud. Press cover cap firmly onto the valve assembly.

Check 9. Final Test

If maintenance procedures carried out involved the disconnection of any internal pipework the following check must be carried out to ensure cross connection has not occurred.

With the percentage control lever at 100% O_2 ensure that an analysis of 100% O_2 at the apparatus outlet is obtained upon inspiratory effort (using test unit). Additionally, the operation of the emergency O_2 supply button must produce a gas flow of analysis 100% O_2.



TEST UNIT

1. T piece for oxygen monitor.
2. Transducer, oxygen monitor
3. Oxygen monitor
4. Inclined water tube manometer
5. Adaptor, manometer to T piece (Select to suit the particular T piece in use).
6. Corrugated tubing 300 mm x 22 mm fittings.
7. Mask holding handpiece OBM340257 (with Mid-O-Gas)
8. Air-Viva recoil bag

Figure 2.

Ensure the Mid-O-Gas unit is re-assembled ready for further use.

PROCEDURES

A Setting Oxygen Percentage

A.1 Remove the percentage scale, control lever locking nut and the mixture control bracket.

A.2 Fit a hose over the control lever stub and connect the hose to an inclined water tube manometer. (Fig. 3)

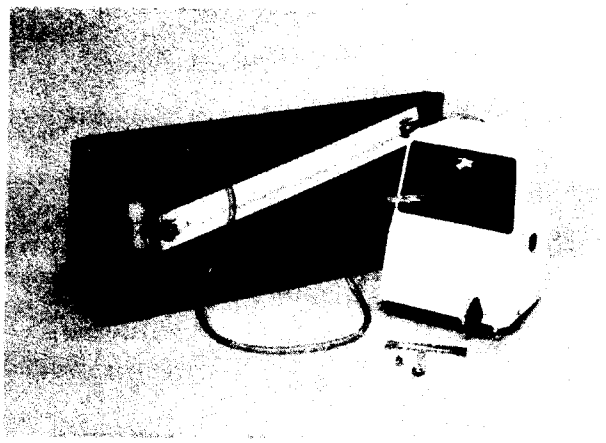


Figure 3.

A.3 Turn off the master control valve and remove the control knob. To operate the N_2O valve (right hand valve on master shut off valve block) push a rigid probe with an end right angle hook through the slot in the front of the console. Contact the right hand section of the valve yoke (Fig. 7d) with the angle hook and pull back until the plunger needle on the N_2O valve is depressed.

A.4 Individual gas pressures within the control regulator can now be checked as follows:-

O_2 delivery pressure is measured by placing the percentage control lever in the 100% position with the master control valve turned on.

N_2O delivery pressure is measured by turning the master control valve "off" and pulling on the positioned probe. The percentage control lever must be at the 30% O_2 position.

Pressures should be equal and within the limits of 1.5 to 2.0 cm H_2O.

NOTE: Pressures above this limit will lift the demand valve shut-off disc and produce a continuous gas delivery.

A.5 To make adjustment to the delivery pressure, remove the rubber grommet from each side of the console to allow access to the adjustment screws. Use a box spanner to loosen the locking nut (¼" BSW) and rotate the adjustment spindle using a screw-driver located in the slotted spindle end.

A.6 Anti-clockwise rotation of the spindle will increase the delivery pressure. When the apparatus is viewed from the front position, Oxygen adjustment is made from the console left hand side and Nitrous Oxide adjustment from the right hand side.

A.7 Final adjustment of the percentages must always be done using the Oxygen Analyser on the apparatus output as detailed in Check 4. Adjustment should be made at the 50% O_2 setting (0% to +5%) and the other positions in Check 4 verified.

B Dismantling Procedure

Console Model (On Wall or Pedestal).

B.1 Shut off gas supply at wall point or line isolating valve.

B.2 Remove the locking rings from the gas outlet (and water filler on older models).

B.3 If a humidifier tank is fitted, withdraw the water filler plug about 1 inch. Remove the retaining pin by applying a probe down the keyway slot beneath the filler plug. Remove the filler plug completely.

B.4 Detach the percentage scale, emergency O_2 valve locknut and extract the press button and return spring.

B.5 Remove the face panel and take out the four screws attaching the console to the apparatus base.

B.6 Remove the master control valve knob, set the percentage control valve lever to one side and remove the console by pulling forward and lifting upwards.

NOTE: Into-Wall Model.

Follow procedures B.1 to B.4 inclusive.

Remove the flush wall mounting panel, remove the two locknuts beneath the shelf and disconnect the supply pipeline connections.

Extract the apparatus from the wall cavity and relocate for easier access.

B.7 Remove the pipe assemblies connecting the master control valve to the warning device and emergency oxygen valve.

B.8 If a humidifier is fitted, mark its position in relation to the block on top of the control regulator. Slacken the locating screws and remove the humidifier.

B.9 Remove the four screws attaching the outlet bracket (or valve block) cover to the top of the control regulator. Detach bracket (or valve block).

B.10 Remove and inspect the sealing "O" ring taking care not to damage or misplace the adjusting shim(s). Note the scribed mark on the side of the mixture control plate and a corresponding mark on the control regulator body. This indicates the resetting position and the disc must be replaced in the same position during assembly.

B.11 If the demand valve shut-off disc is dirty it should be cleaned and polished with a soft cloth and Methylated Spirits.

B.12 Remove the screws around each regulator bonnet and detach the bonnet and diaphragm control spring. The diaphragm is removed by sliding it upwards towards the control block. Inspect the diaphragm for damage or signs of perishing.

NOTE: Care must be taken to avoid damaging the sealing faces on each bonnet. Do not lever or prise the bonnet free with a sharp instrument.

B.13 Remove the screws attaching the seat lever pin to the body and extract the lever and pin. Remove the seat assembly, replace new assemblies as required.

B.14 Access to the control regulator seat assembly requires removal of the base plate by unscrewing the holding locknuts and disconnection of all tubing to the master control valve. The seat housing locknuts must be loosened and removed, the inlet spacer detached and the regulator seat housing unscrewed and removed.

See Figure 6 for identification of above-mentioned items.

B.15 For assembly detail on the warning device/ air inlet apparatus, emergency oxygen valve and master shut off valve, refer to the relevant diagrams attached. (Figure 7).

C Re-Assembly Procedure

The apparatus is re-assembled in the reverse order of the Dismantling Procedure. The cleanliness of all components is essential and a re-inspection of all items for damage should be carried out.

The following details require particular attention.

C.1 Before tightening the screws holding the seat lever pin to the body ensure that the pin is sitting within its groove in the body.

C.2 When re-positioning the control regulator seat housing and seat lever the critical dimension nominated "A" on sectional drawing, (Fig. 6) must be achieved. With seat lever pin installed and the seat lever held firmly bearing on the seat assembly a dimension of 18 mm (0.71 inches) is set between a straight edge across the diaphragm bearing face of the dual regulator body and the regulator stirrup loading point on the seat lever arm.

Adjustment of the control regulator seat housing allows the setting of dimension "A". (Ref. B14).

NOTE: It is recommended that a suitable dimension setting tool be made to aid this measurement procedure.

C.3 It is recommended that, when necessary, the diaphragm is replaced by a complete diaphragm assembly (including regulator stirrup, retainer diaphragm plate and diaphragm). It is essential that the diaphragm is located in an even, unstressed condition when the bonnet is screwed to the dual regulator body.

Before positioning the diaphragm assembly ensure the regulator stirrup aligns with the common extended centre line between two opposite peripheral diaphragm holes. (Fig. 4) The diaphragm holes must neatly lie over the threaded holes in the regulator body face prior to attaching the bonnet. Tighten the bonnet retaining screws evenly.

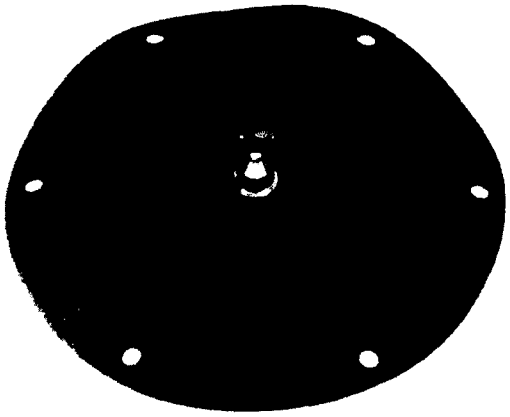


Figure 4.

C.4 If the mixture control plate seat or the equivalent bearing face on the control regulator body is worn or scratched, lap carefully until flat. Following the lapping operation an additional shim beneath the "O" ring in the top of the control disc may be required to obtain a good seal. Replace "O" ring if worn or damaged.

C.5 Ensure that the setting marks on the mixture control plate and the control regulator body are aligned during assembly. The percentage control lever must be indicating the 54% O_2 position on the percentage scale when the setting marks are aligned.

Warning: The above mentioned setting marks and the percentage scale location are pre-set during manufacture. Replacement of the mixture control disc **only** must not be conducted without accurate determination that the control apertures are

equal when the setting marks are aligned and the percentage control lever indicates 54% O_2. This operation is not recommended in the field situation.

C.6 Conduct Checks 2, 3, and 4 after re-assembly.

Bubble test all sealing joints on the apparatus under full supply pressure conditions after re-assembly.

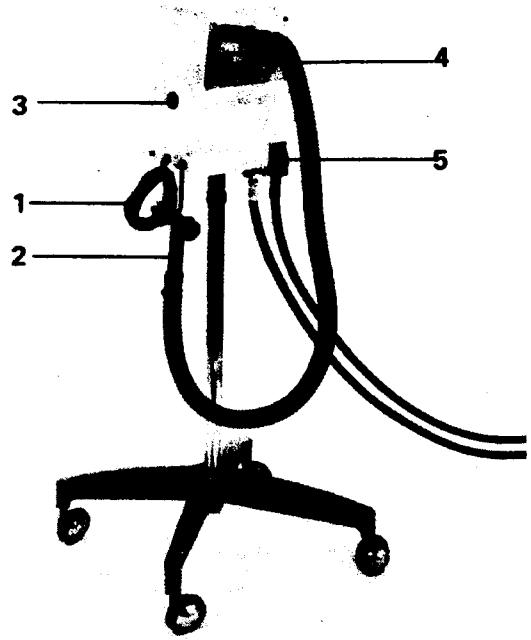
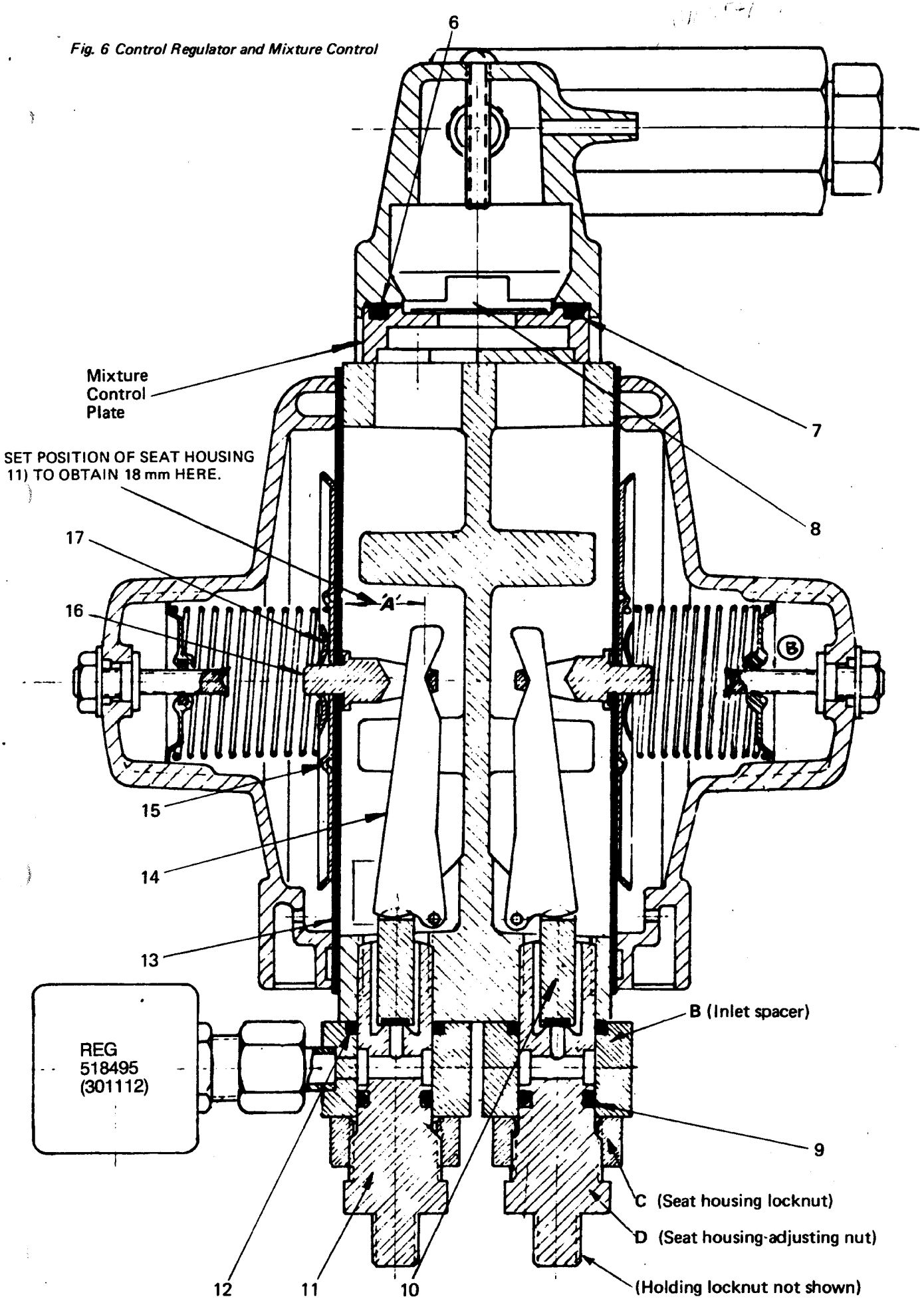


Figure 5.

PARTS LIST
ITEMS REPLACEABLE UNDER MAINTENANCE SERVICE

Item	Part No.	Description	Qty.
1	M1110	Facemask, anti-static	1
2	OBM340257	Handpiece, mask holding	1
3	NB705	Grommet, ¾" dia. hole	2
4	OBM372748	Corrugated tube, one metre, anti-static	1
5	NB559	Knob, master shut-off valve	1
6	DM427	Shim, control adjusting	As Required
7	OR27A1	"O" ring	1
8	DM435	Disc, shut-off, demand valve	1
9	OR9A2	"O" ring	2
10	DM423	Seat assembly	2
11	DM421	Housing, seat	2
12	OR12A2	"O" ring	2
13	DM431	Diaphragm	2
14	DM432	Lever, seat	2
15	DM430	Plate, diaphragm	2
16	DM429	Stirrup, regulator	2
17	NB538	Retainer, ¼" dia.	2

Fig. 6 Control Regulator and Mixture Control



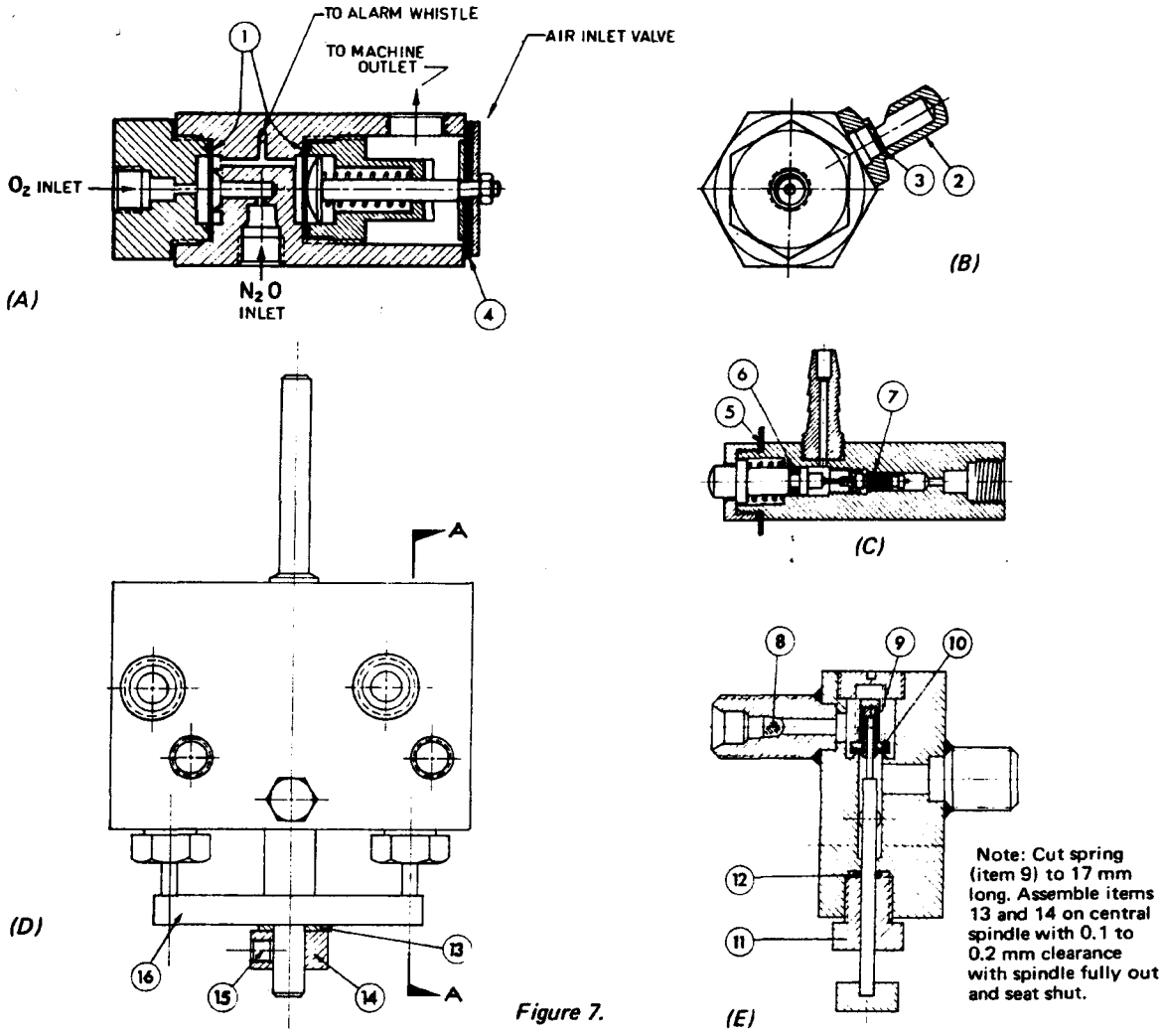

TO ALARM WHISTLE
TO MACHINE OUTLET
AIR INLET VALVE
O_2 INLET
N_2O INLET
(A)
(B)
(C)
(D)
(E)
Note: Cut spring (item 9) to 17 mm long. Assemble items 13 and 14 on central spindle with 0.1 to 0.2 mm clearance with spindle fully out and seat shut.

Figure 7.

Item	Part No.	Description	Qty.
1	DM468	Diaphragm	2
2	M537	Cap, safety valve	1
3	M543	Disc, safety valve	1
4	DM474	Neoprene washer	1
5	NB1284	Washer	1
6	OR1A2	"O" ring	1
7	7968003	Valve, Schrader	1
8	AT45	Filter	2
9	NS9	Spring, air valve	2
10	NS37	Seat (complete)	2
11	DM464	Screw, gland	2
12	OR1A2	"O" ring	2
13	DM453	Washer, P.T.F.E.	1
14	DM454	Collar	1
15	NB493	Screw, socket, 3/16" BSW x 3/16" Lg.	1
16	DM462	Yoke	1

CIG Medishield

The Commonwealth Industrial Gases Limited
(Incorporated in New South Wales)
Medishield Division
Macquarie Technology Centre
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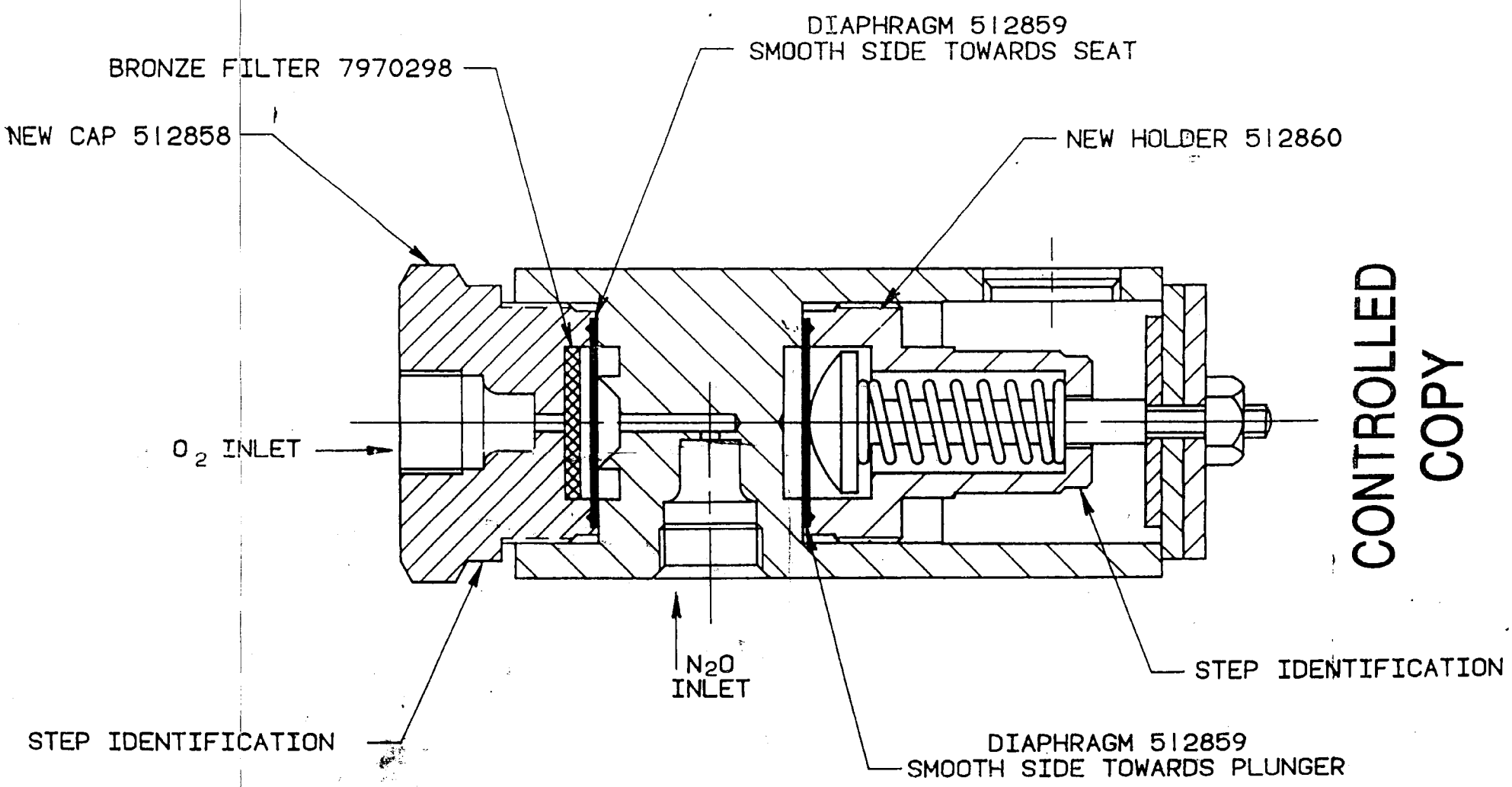
INSTALLATION OF REPLACEMENT DIAPHRAGMS
MID-O-GAS WARNING DEVICE



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ASSEMBLY NOTE:

1/ MEASURE THICKNESS OF DIAPHRAGM (512859) AND REMOVE MATERIAL FROM FACE OF CAP (512858) IF REQUIRED TO GIVE 0.05/0.08 MM SQUASH TO DIAPHRAGM (512859).
2/ REPEAT ABOVE PROCEDURE FOR HOLDER (512860).

PART NO.	ISSUE	DATE
522071	03	794

Norgren Regulator Kit

COMWELD GROUP
MEDICAL PRODUCTS

INSTALLATION INSTRUCTIONS - KIT Pt.No. 512467

1. DESCRIPTION

Kit Pt.No.512467 is a replacement primary regulator kit for the Mid-O-Gas apparatus TM36, TMIII and TM114.
It contains Norgren regulators, which have been cleaned for medical use, nylon tubing, push in fittings, and a number of special adaptors.

2~ GENERAL INFORMATION

2.1 Norgren Regulators.

Norgren regulators have 1 inlet port and 3 outlet ports, The inlet port is marked with an arrow and the regulator seat is visible through the port.
then installing ensure that the supply gas is connected to the port marked with the arrow.

2.2 Diameter Coding of Tubing.

To prevent gas cross connection, the 1/4 inch. diameter tubing and fittings must be used for the Oxygen connections and the 5/16 inch. diameter tubing and fittings must be used for the Nitrous Oxide connections.

2.3 Snap Gauge Testing.

Both Norgren regulators have a connection to which a snap gauge may be fitted to set and check the outlet pressure. This fitting is normally sealed with a blind nipple.

2.4 Thread sealants.

For general use, Loctite 520 Pipe Sealant is recommended.
For the 1/8 BSP regulator to snap gauge fitting-Loctite 271 or Loctite 277 is recommended to prevent the fitting from turning when a snap gauge is attached.

3. CONTENTS

Item	Part Number	Description	Quantity
1	K50	Nut 1/4ins.BSP	2
2	512258	Regulator Norgren 0-350Kp	2
3	512434	Elbow Swvl 1/8BSPT-1/4tube	
4	512443	Elbow Swvl 1/4BSPT-1/4tube	
5	512454	Adaptor Regulator	4
6	512455	Nipple Blank	2
7	512456	Elbow Swvl 1/8BSPT-5/16tube	
8	512460	Elbow Swvl 11/4BSPT-5/16tube	
9	512464	Adaptor ON/OFF control to elbow	2
10	512465	Tube 1/4 OD	
11	512466	Tube 5/16 OD	
12	7966030	Circlip Bowed Ext.22.2 mm	2
13	521982	Instructions	

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4. PROCEDURE

Notes:- This kit should be installed by a person trained in the servicing of the Mid-O-Gas apparatus.
It is important that this procedure is carried out in conjunction with the servicing procedures detailed in Servicing Instructions, Part No. 521467

1. Remove the outer case.
2. Remove the pipes connecting the inlet block to the primary regulators then remove the regulators.
3. Disconnect the 02 and N20 pipes at the air valve and pull off the PVC tube that supplies the emergency oxygen.
4. Turn the unit over and undo the nuts that secure the main assembly to the base bracket, then remove the base bracket.
5. Taking care not to move the secondary regulator seat housings, Slightly loosen both locknuts on the inlets to the secondary regulators and swivel the inlets so that they point towards the rear corners of the base bracket when refitted. Refit the base bracket. Note:- In some assemblies, there may be more room if the 02 inlet is positioned towards the front corner of the base bracket.
6. Fit Elbow item 3 to the inlet of one of the Norgren regulators and Elbow item 7 to the inlet of the other Norgren regulator.(see Note 2.1.)
7. Fit Adaptor item 5 to the opposite ports of both regulators.
8. Looking at the base of the regulator, blank off the port next clockwise from the inlet of the regulator, then place another adaptor item 5 in the remaining port, of both regulators.
9. Fit the regulators to the main assembly: making sure that the regulator with the 1/4 ins. fitting is connected for Oxygen service and the regulator with the 5/16ins. is connected for Nitrous Oxide service.(see Note 2.2). Position the regulators to clear the outer case , then tighten both lock nuts on the swivel inlets to the secondary regulators.
10. Fit Adaptor item 9 to Elbow item 4 then connect this assembly to the 02 outlet of the inlet block. Bend the Adaptor to clear the bonnet of the N20 secondary regulator
11. Fit Adaptor item 9 to Elbow item 8 then connect this assembly to the N20 outlet of the inlet block.

12. Using the Nylon tubing, 1/4ins. for 02 and 5/16ins. for N20, connect the inlet block to the Norgren regulators. Run and cut the Nylon tubing so that the tubing is not strained, is clear of the outer case and the adjustment screws of the secondary regulators. The method of assembly of Push In Tube Fittings is:

a) Ensure that the end of the nylon tube is properly squared off.
b) Simply push the tube into the collet until it locates through the 'O' ring. then pull back.
c) To dismantle, simply push the tube into the fitting, hold down the collet and withdraw the tube.

13. Reconnect, the 02 and N20 pipes to the ai r valve and reconnect the emergency oxygen supply PVC tubing.
14. Remove the secondary regulator bonnets and diaphragms, in turn, to check the critical dimension "A". If necessary, reposition the seat housing. (refer to the Mid-O-Gas Servicing Instructions)
15. Fit a snap gauge to the 02 Norgren regulator, pressurise with oxygen, and set the regulator to 280kPa. Lock with Clip item 12. Replace the snap gauge with Nipple item 6.and Nut item
16. Repeat the procedure using nitrous oxide for the N20 Norgren regulator.
17. Complete the assembly of the Mid-O-Gas and check it's calibration, i n accordance with the Service Instructions.